



Distribution Incentive System (DIS)

Navy Personnel Research, Studies, & Technology

The Research Problem & Situation



- Focus is on detailer or “matchmaker”...not sailors or commands
- Involuntary assignments
- Commands are largely excluded
- Fairly static wage structure

Why an Auction Not Fixed Incentives

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Sailor Preference Heterogeneity Across Billets

- Benefits Sailors

Bids offer Sailors a means to affect their next assignment

- Benefits Navy

Identifies the Sailor who least dislikes an undesirable job

Why Are Auctions Used?

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- **Efficient price discovery mechanism when value is unknown**

Treasury Securities

Antiques

3G Mobile Phone Licenses

Auction Literature: Lessons from Previous Research

Why Sealed Bid

- Limited connectivity – equity issues
- Sealed bids make collusion more difficult (Klemperer)
- If lack of competition is a concern then a sealed bid approach is preferable (Klemperer)

Overview of Proposed Auction Process

- › Navy determines eligibility criteria and scoring rule
 - Aggregate Fitness Score = $\text{fn}(\text{moving \$, skill-match, Sailor input, command input, gap/overlap...})$
- › Navy determines which billets are eligible for incentives
- › Sailor bids/applies for jobs
 - Sailor inputs bid or selection score for job
- › Commands provide input as to which Sailors they prefer
- › Detailer creates assignment slate based on Aggregate Fitness Score

US Navy **Distribution Incentive System**



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Login

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NPRST DIS Demo

You are logged in as: **Test AIA**

Role: **AIA**



Set Scoring Weights

Scoring Rule - Auction - AllNavy_6Dec2002

Navy MOEs:

Biddable Attributes:

Command Subsidy:

Save as Default: ☐

Assign Weights by:

☒ Manual

☐ Tool



Save

Cancel



NPRST DIS Demo

You are logged in as: **Test AIA**Role: **AIA**

Select Navy MOEs

Auction - AllNavy_6Dec2002

Select/Un-Select MOEs using horizontal arrows.

Available MOEs

Gap/Overlap
PaygradeMatch
RequisitionPriority
NECREutilization



Selected MOEs

PCSCost
On-TimeArrival
SkillMatch

Save as Default: ☐

Save

Close



NPRST DIS Demo

You are logged in as: **Test AIA**

Role: **AIA**



Set Weights for Navy MOEs

Enter the Weights for the MOEs: Auction - AllNavy_6Dec2002

PCSCost

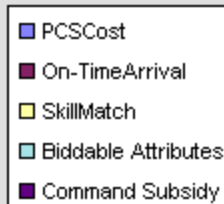
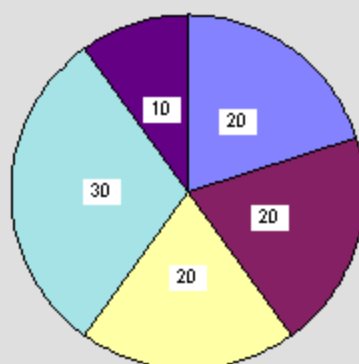
On-TimeArrival

SkillMatch

View

The Scores should Sum to **60**

Distribution Graph



Save

Cancel



NPRST DIS Demo

You are logged in as: **Test AIA**

Role: **AIA**



Set Weights for Navy MOEs using APMS

What-if Analysis: **Auction - AllNavy_6Dec2002**

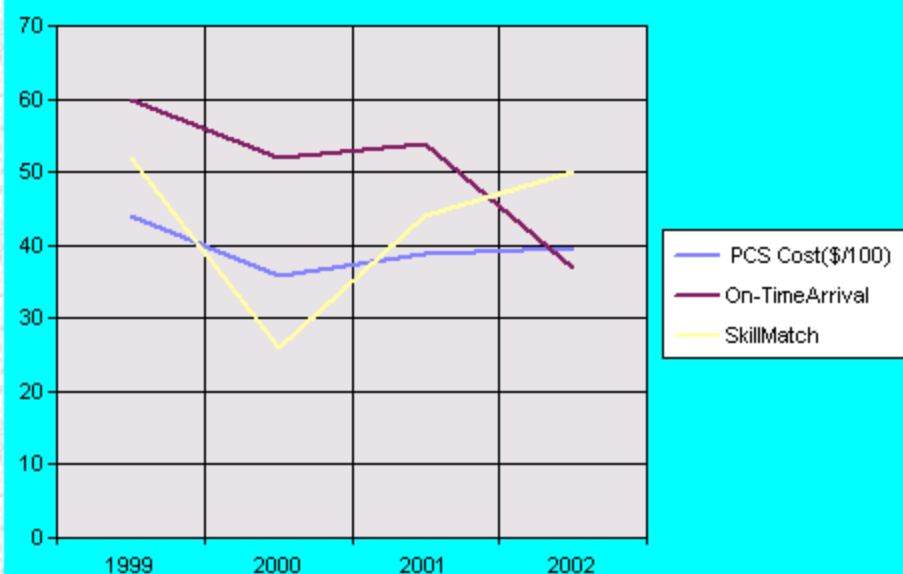
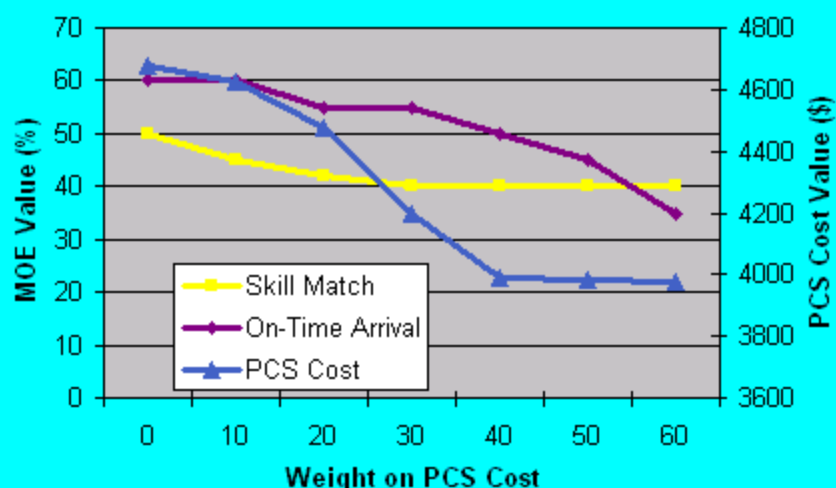
| MOE | MAX | MIN | VALUE | WEIGHT |
|----------------|------|------|-------|--------|
| PCSCost | 9552 | 3978 | 4003 | 20 |
| On-TimeArrival | 75 | 0 | 50 | 20 |
| SkillMatch | 50 | 10 | 50 | 20 |

| MOE | Value / Wt (1) | Value / Wt (2) |
|----------------|----------------|----------------|
| PCSCost | 4472 / 20 | 3978 / 30 |
| On-TimeArrival | 62 / 20 | 37 / 10 |
| SkillMatch | 42 / 20 | 50 / 20 |

Trade-Off Graphs of MOEs

Compare Past performance with this auction

Trade-Off PCS Cost Weight



Save

Cancel



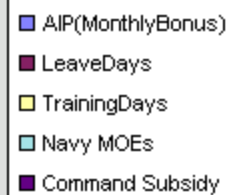
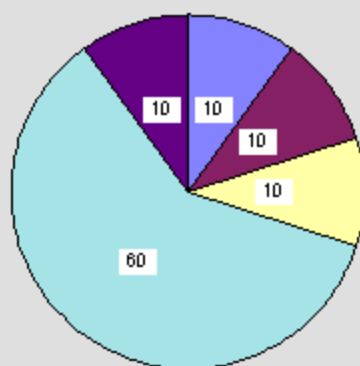
NPRST DIS Demo

You are logged in as: **Test AIA**Role: **AIA**

Set Weights for Biddable Attributes

Enter the Weights for the Biddable Attributes: Auction -
AII Navy_6Dec2002AIP(MonthlyBonus) LeaveDays TrainingDays **View**The Scores should Sum to **30**

Distribution Graph

**Save****Cancel**



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You are logged in as: **Test AIA**

Role: **AIA**



Set Maximum Bid

Define Maximum Bid Rules: Auction - AllNavy_6Dec2002

Decide Maximum Bid Using

- ☐ Tool
☒ Manual

[View/Edit Rules](#)

Notify Sailors of Reservation Wages ?

- ☒ Yes
☐ No

How to treat bids above Reservation Wages ?

- ☐ Penalize
☒ Disallow

[Specify](#)

Select Job to Edit Bid Limits

| Activity | Rate | Paygrade | Priority | TUM | Sea/Shore Code |
|-----------------------|-------------|------------|------------|-------------------|----------------|
| NCMOC BAHRAIN | AG3 | E-4 | 015 | 9/15/2003 | 3 |
| NCMOC BAHRAIN | AG3 | E-4 | 010 | 8/15/2003 | 3 |
| NCMOC BAHRAIN | AG3 | E-4 | 007 | 6/15/2003 | 3 |
| NCMOC BAHRAIN | AGCS | E-8 | 001 | 7/15/2003 | 3 |
| NEMOF NAPLES | AGCS | E-8 | 002 | 12/15/2002 | 3 |
| NLMOD KEFLAVIK | AGCS | E-8 | 001 | 7/15/2003 | 3 |
| NLMOD KEFLAVIK | AG2 | E-5 | 011 | 9/15/2003 | 3 |
| NLMOD KEFLAVIK | AG2 | E-5 | 010 | 9/15/2003 | 3 |
| NCMOD D GARCIA | AG2 | E-5 | 012 | 9/15/2003 | 3 |

Job Details

Select a job to View Details

| | Maximum Bids: | Budget | Pro Rata |
|------------------------|----------------------------------|--------|----------|
| AIP (Monthly Bonus) | <input type="text" value="500"/> | 30000 | 250 |
| LeaveDays | <input type="text" value="0"/> | 240 | 10 |
| TrainingDays | <input type="text" value="4"/> | 420 | 4 |

[Finish](#)

US Navy

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| Activity | Paygrade | Rate | Priority | TUM | SeaShoreCo |
|----------------|----------|------|----------|-----------|------------|
| NLMOD KEFLAVIK | E-6 | AG1 | 001 | 6/15/2003 | 3 |
| NLMOD KEFLAVIK | E-6 | AG1 | 002 | 9/15/2003 | 3 |
| NLMOD KEFLAVIK | E-6 | AG1 | 003 | 9/15/2003 | 3 |
| NLMOD KEFLAVIK | E-6 | AG1 | 004 | 9/15/2003 | 3 |
| NLMOD KEFLAVIK | E-8 | AGCS | 001 | 7/15/2003 | 3 |

Points used this cycle: 10

| Job | Priority | Sailor Name | Subsidy |
|------|----------|-------------|---------|
| AGCS | 001 | ----- | 8 |
| AGCS | 001 | ----- | 1 |
| AGCS | 001 | ----- | 1 |

10 points

| Name | Navy Score | Will Bid? | SeaShore | Rate | PRD | Subsidy |
|-----------------|------------|-----------|----------|-------------|------------------|----------|
| Sailor 1 | 58 | Y | 2 | AGCS | 6/15/2003 | 0 |
| Sailor 2 | 40 | Y | 2 | AGCS | 7/15/2003 | 0 |
| Sailor 3 | 36 | N | 2 | AGCS | 9/15/2003 | 10 |
| Sailor 4 | 35 | Y | 6 | AGCS | 3/15/2003 | 8 |
| Sailor 5 | 33 | N | 2 | AGCS | 12/15/2002 | 5 |
| Sailor 6 | 33 | Y | 2 | AGCS | 5/15/2003 | 1 |
| Sailor 7 | 27 | Y | 6 | AGCS | 2/15/2003 | 1 |

| Measure | Weight | Value | Score |
|-------------------------|-----------|----------|-----------|
| PCSCost | 20 | 2353 | 18 |
| On-TimeArrival | 20 | 1 | 20 |
| SkillMatch | 20 | 1 | 20 |
| Total Navy Score | 60 | | 58 |
| Command Subsidy | 10 | 0 | 0 |

Clear

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NPRST DIS Demo

 You are logged in as: **Jessica lamastus**

 Role: **Sailor**


Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo

Sailor Makes/Reviews Bids

 You are logged in as : **Jessica lamastus**

My Jobs

| Rating | Activity | Location | TUM | Pref | Navy | Hot Job | Max bid | My bid |
|--------|---------------------------------|-------------------|------------|------|------|---------|-------------------|-------------|
| ▶ AGCS | NLMOC USJFCOM | Ingleside, TX | 7/15/2003 | | | N | Rate from 0 to 30 | 30 |
| AGCS | NLMOD KEFLAVIK | Keflavik, Iceland | 7/15/2003 | | | | 400 / 10 / 0 | 400 / 2 / 0 |
| AGCS | NPMOC SAN DIEGO | San Diego, CA | 8/15/2003 | | | | Rate from 0 to 30 | 25 |
| AGCS | NCMOC BAHRAIN | Bahrain | 7/15/2003 | | | | 400 / 10 / 10 | 0 / 0 / 10 |
| AGCS | NEMOF NAPLES | Naples, Italy | 12/15/2002 | | | | 0 / 5 / 10 | 0 / 5 / 10 |

[Make/Edit Bid](#)
[No Bid](#)

100%
 90%
 80%
 70%
 60%
 50%
 40%
 30%
 20%
 10%
 0%

[Submit](#)
[Logout](#)

Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo DIS-Demo



NPRST DIS Demo

You are logged in as: **Jessica lamastus**

Role: **Sailor**



Sailor 'Make/Edit Bid'

Bid Calculator

Job: NLMOG USJFCOM

My Personal Preference Score: 100

How my Score on this job has been calculated

| Navy Measures: | Weight | My Value | My Score | Modify Bid |
|-------------------|------------|----------|-----------|------------|
| PCS Cost | 20 | 1560 | 19 | |
| On-Time Arrival | 20 | 1 | 20 | |
| Skill Match | 20 | 1 | 20 | |
| My Bid: | 60 | | 59 | |
| Preference Points | 30 | 30 | 30 | |
| Command Subsidy | 10 | | 0 | |
| | 35 | | 30 | |
| Total: | 100 | | 89 | OK |

[My Jobs](#)No Bid[Logout](#)



NPRST DIS Demo

You are logged in as: **Jessica lamastus**

Role: **Sailor**



Sailor 'Make/Edit Bid'

Bid Calculator

Job: NLMOD KEFLAVIK

My Personal Preference Score: 100

How my Score on this job has been calculated

Navy Measures:

Weight

My Value

My Score

Modify Bid

PCS Cost

20

2353

18

On-Time Arrival

20

1

20

SkillMatch

20

1

20

My Bid:

60

58

AIP (Bonus / month)

10

\$400

0

Training Days

10

2 pts

8

Leave Days

10

0 days

10

Command Subsidy

10

0

40

18

Total:

100

76

OK



NPRST DIS Demo

You are logged in as: **Jessica lamastus**

Role: **Sailor**



Sailor Auction Results Review - Assignment

You are logged in as : **Jessica lamastus**

You have been assigned to a new job!

Taking into account your bids and the Navy's needs, you have been assigned to the following job:

Job Details

Activity NLMOG USJFCOM
Rate AGCS
TUM 7/15/2003
MCA BUPERS
Duty Type (SSC) 1
Location (Base) ING (Ingleside, TX)



[Job Details](#)

My Bid

(Unless otherwise noted, this bid has been awarded to you as your incentive package)

List of Unawarded Jobs

| | Activity | Paygrade | TUM | My bid | Navy Base Score | Navy Score with Bid | Best Score |
|---|-----------------|----------|------------|-------------|-----------------|---------------------|------------|
| ▶ | NCMOG BAHRAIN | E-8 | 7/15/2003 | 0 / 0 / 10 | 59 | 79 | 79 |
| | NPMOG SAN DIEGO | E-8 | 8/15/2003 | 25 | 38 | 62 | 62 |
| | NEMOF NAPLES | E-8 | 12/15/2002 | 0 / 5 / 10 | 35 | 45 | 65 |
| | NLMOG KEFLAVIK | E-8 | 7/15/2003 | 400 / 2 / 0 | 58 | 76 | 76 |

[Logout](#)

US Navy

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You are logged in as: **Test Detailer**

Role: **Detailer**



Review Auction Results: Recommended Assignments

Assignments: 8 Total Score: 477

Recommended Matches

| Name | Activity | Total Score | Trng? | Paygrade(J) | SeaShoreCode | TUM | Priority | Paygrade(S) |
|------------------|-----------------|-------------|-------|-------------|--------------|------------|----------|-------------|
| LAMASTUS JESSICA | NLMOC USJFCOM | 89 | N | E-8 | 1 | 7/15/2003 | 002 | E-8 |
| MCKAY JEFFERY | NLMOD KEFLAVIK | 70 | N | E-8 | 3 | 7/15/2003 | 001 | E-8 |
| KESTENBAUM TRENT | NAVLANMETOCCEN | 60 | N | E-8 | 1 | 9/15/2003 | 003 | E-8 |
| SMALL RIKKI | NPMOC YOKOSUKA | 56 | N | E-8 | 6 | 7/15/2003 | 003 | E-8 |
| DONEY LORI | NEMOF NAPLES | 56 | N | E-8 | 3 | 12/15/2002 | 002 | E-8 |
| HOBART SOO | NCMOC BAHRAIN | 51 | N | E-8 | 3 | 7/15/2003 | 001 | E-8 |
| SLOWDEN TAMEKA | NPMOC SAN DIEGO | 48 | N | E-8 | 1 | 8/15/2003 | 002 | E-8 |
| MCNULTY JAMES | NAVPACTOCCEN | 47 | N | E-8 | 1 | 12/15/2002 | 001 | E-8 |

Bid Details

| Measure | Weight | Value | Score |
|-------------------------|-----------|----------|-----------|
| PCSCost | 20 | 1560 | 19 |
| On-TimeArrival | 20 | 1 | 20 |
| SkillMatch | 20 | 1 | 20 |
| Total Navy Score | 60 | | 59 |
| SailorPreference | 30 | 30 | 30 |
| Total Bid Score | 30 | | 30 |
| Command Subsidy | 10 | 0 | 0 |

Sailor Details

Alternative Jobs

Job Details

Alternative Sailors

Confirm Match

Save

View Unassigned

View Matches

Confirm Slate

Cancel

End

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S&T Research: Functionality & Business Rules

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Research and Test Enhancements to Sea Warrior CMS

- › Multi-Attribute Auction Design
 - Sailor tradeoffs across alternative incentives
- › DST to aid determination of optimal auction parameters
- › Develop methodologies to flag “hard-to-fill” jobs early
- › Enhanced command input methodology
- › Develop Algorithms for Cross Billet Optimization DST
- › Methods for Sailors to Express Preferences for non-auction billets
 - Must allow optimization across all billets

Efficiency & Auction Design Research

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S&T Gaps affecting auction efficiency - DIS Research

- › Bid Weight & Bid Inflation
- › Collusion & requisition cycle length
- › Effect of one win only rule on bid structure
- › Effect of bid ceilings on bid structure

Why a Multi-Attribute Auction?

Sailor Preference Heterogeneity Across Alternative Incentives

- Benefits Sailors

Allows them to tailor their incentive package

- Benefits the Navy

Identifies the least cost combination of incentives for each Sailor

Alternative AIP Allocation Methodologies

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Literature Review Informs Market Driven Design

- Four Basic Types of Auctions
 - English Auction;
 - Dutch Auction;
 - First Price Sealed Bid (FPSB);
 - Second Price Sealed Bid (SPSB).
- Revenue Equivalence
 - Breaks down with risk averse bidders (Harris and Raviv)

Auction Literature: Lessons from Previous Research

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Why First Price Auction

- With risk averse bidders FPSB auctions perform better than English or SPSB auctions (Harris and Raviv, and Riley and Samuelson)
- FPSB auctions are susceptible to auctioneer cheating (Klemperer)
- Easier to implement with a scoring rule